



MOORE - ERROR OF AGRICULTURE - BALTIMORE 1804

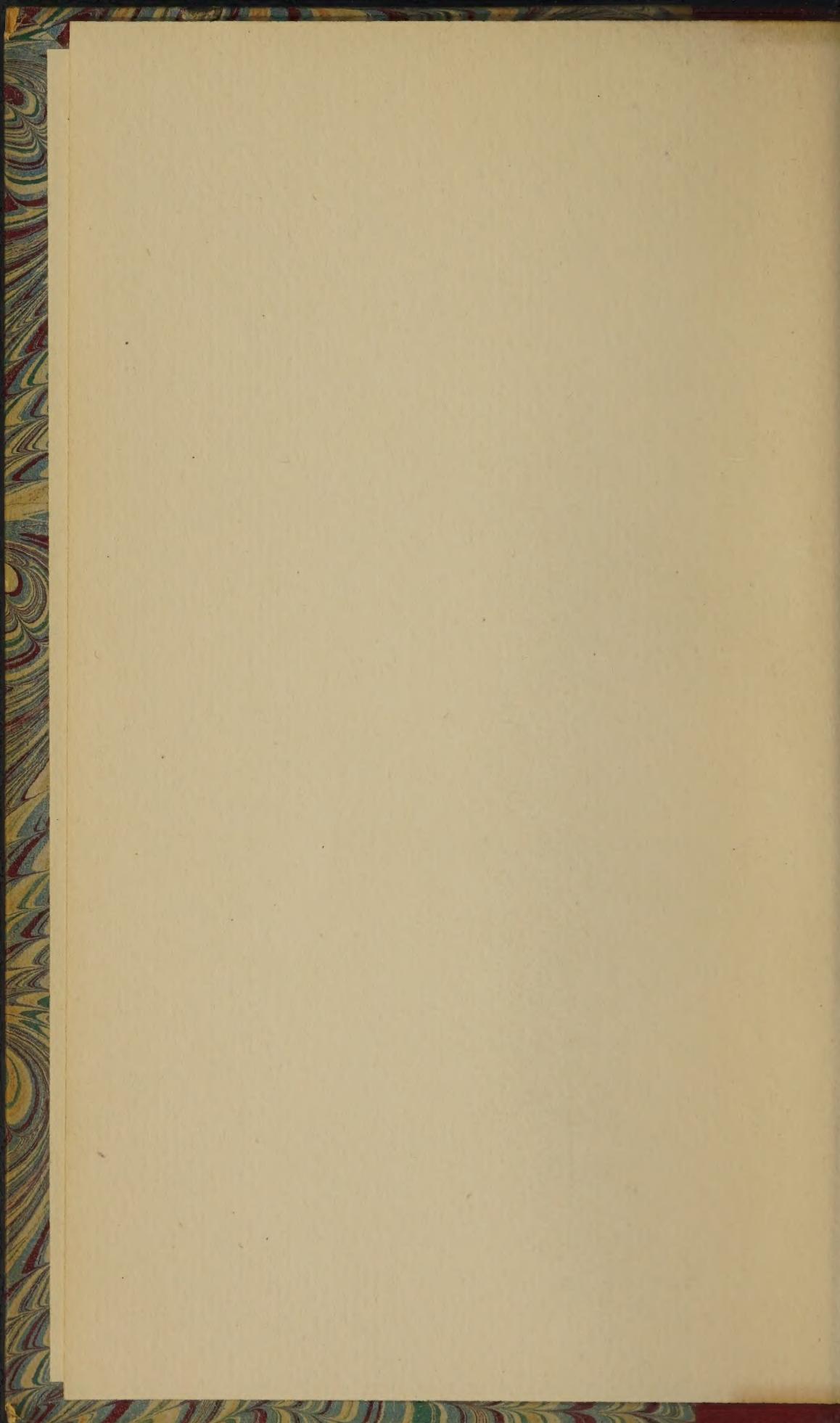




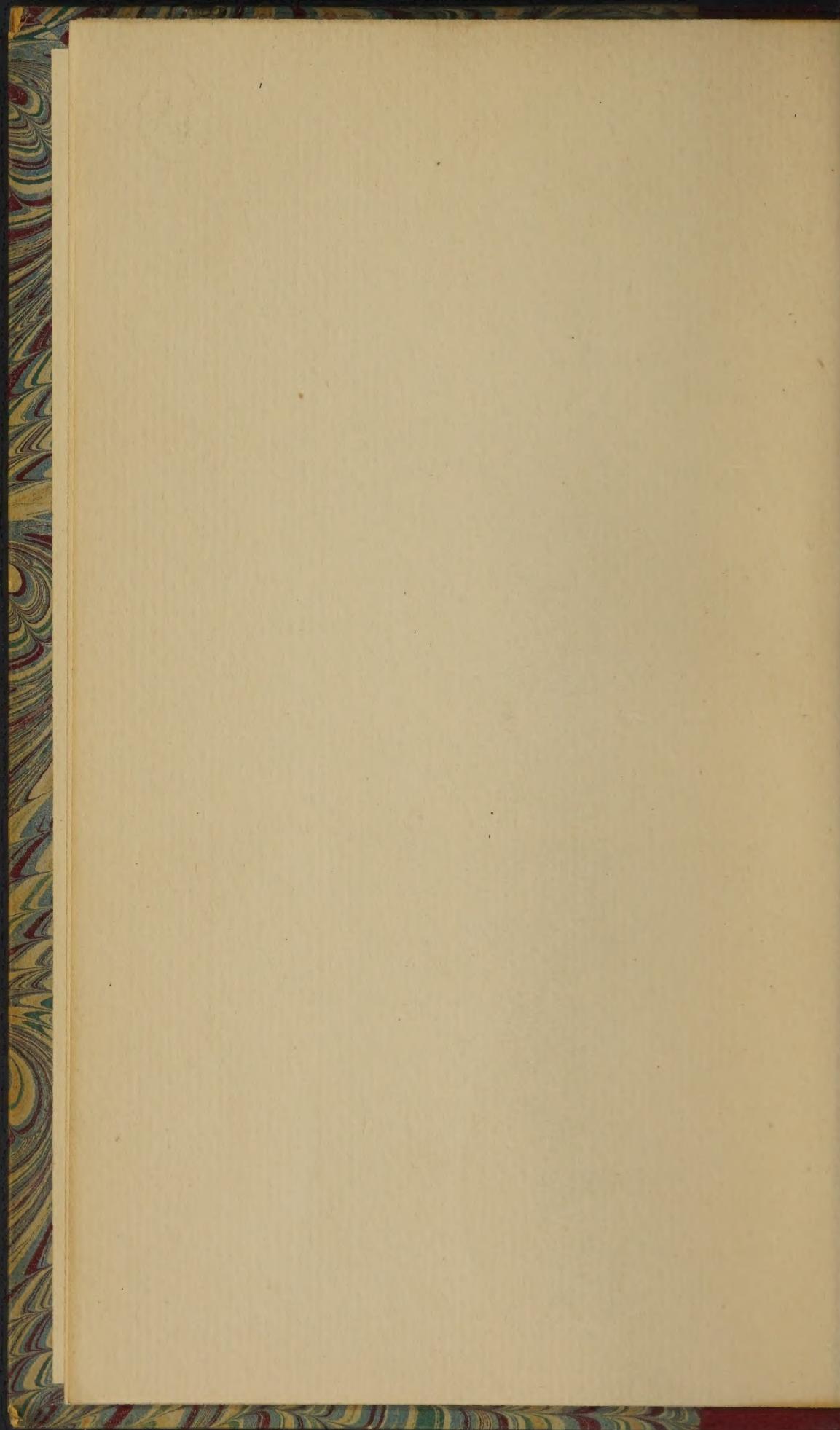


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*A M E R I C A N A G R I C U L T U R E*  
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1801.

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## TO THE READER.

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*THE author of the following observations, has, for a number of years past, been of the same opinion that he now is, respecting the mode of cultivation practised in the United States; and having, from observation and experience, had abundant proofs to induce him to believe, that his opinion is well founded, has for some time thought that advantages would result to the community, from the subject being more generally considered; but feeling conscious of his want of those literary qualifications, necessary, in order to escape the criticism of this refined age.*

*HE, for a while, contented himself with expressing his sentiments occasionally to some of his acquaintance; but at length, reflecting, that if there was any thing valuable in them, and he should leave the world without making them public, he would, in some measure, fall short in his duty, of contributing all in his power to the happiness and comfort of mankind; he therefore*

concluded to commit them to writing, and leave it entirely to some of his friends (whose judgment he preferred to his own) to say, whether they were worth publishing or not. They have advised the measure—And now, having been actuated by these motives, and taken these steps, if the language should prove sufficient to convey the author's meaning, and his observations should have any tendency to turn the attention of the public to the subject, he will rest entirely easy respecting what critical reviewers or literary connoisseurs may say of the performance. But at the same time, solicits any useful hints that can be offered on either side of the question; for having had many proofs of his fallibility, he will feel but little mortification if he should even be found on the wrong side, provided his fellow citizens are benefitted by the investigation.

T. MOORE.

Retreat, Montgomery County,  
Maryland, 8th Month, 1801.

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THE  
G R E A T   E R R O R  
O F  
A M E R I C A N   A G R I C U L T U R E  
E X P O S E D , &c.

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PREJUDICE, that great bar to improvement in the arts and sciences, perhaps no where exerts its baneful influence with more mischievous effect than in the practice of agriculture, particularly on this part of the American continent. Our predecessors emigrating from the different European countries, each brought with him the prejudices he had imbibed in his native land, and adopted the practice in this country, that he, and perhaps his forefathers, for ages before him, had adhered to, notwithstanding the great difference of soil and climate absolutely requiring a very different course of conduct. These prejudices acquired strength by time, and practices became venerable for

their antiquity: and being accustomed to consider ourselves as the children of the countries from which we descended, of course we looked up to them as the only legitimate sources of improvement; the consequence of which has been, that notwithstanding considerable improvements and discoveries in agriculture have been made in Great Britain and other European countries, we have not derived those advantages from them, which might have been expected. Many of them having been implicitly adopted here, without the necessary variation for the difference in soil and climate, have failed. These unsuccessful experiments have tended to confirm the people of America in their former prejudices, and to induce them to treat with contempt every appearance of innovation in theory or practice.

So that, till very lately, a person in America would be almost as much exposed to ridicule by attempting to teach the art of ploughing, as that of walking, or

any other common animal function. But happily for us, since the revolution, some of the citizens of the United States begin to think for themselves, and to seek in their own country for improvements; and during the short period of twenty years since that event, greater advances have been made in American agriculture than in a century preceding.

UNDER these auspices, I am encouraged to hope, that at least a part of the community will not condemn the following observations unheard. I wish my readers to divest themselves of every prejudice, as fully as if they had never read a treatise on agriculture, or were acquainted with no system of practice, until they have fairly weighed the arguments: then compare them with their own experience, and according to their merits let them stand or fall.

THE native soil of a great proportion of the United States, so far as I am

acquainted, or have been informed, consists of a black mould from one to four inches deep (on river bottoms, and other low places often much deeper) probably composed from leaves and other decayed vegetables. Immediately below this, is found a stratum of loam, clay or sand, most commonly loam, intermixed with some kind of stone. The mould or virgin soil is always found extremely productive.

THE climate, with respect to heat and cold, is various; in the eastern and middle states, the frosts are severe, the surface of the ground being generally frozen for several months during winter; but their severity gradually decreases as we advance southward. In every part of the United States a considerable quantity of moisture falls in the winter and spring, in the different forms of snow, hail and rain: In summer, thunder gusts, with intervals of hot dry weather, are also common.

LET us now consider some of the most visible effects of the climate, on the lands in tillage.

THE winter frosts are no doubt useful, in dividing and ameliorating the soil; repairing in some degree, the injury it sustained the preceding summer. During summer, a great proportion of the rains falling hastily, the consequence is, that wherever the ground is not opened to a sufficient depth, to imbibe the whole before the surplus can have time to penetrate the hard *pan* beneath, a part of the soil becomes *fluid*; and if the surface is not a dead level, a portion of it, is carried off: the remainder has a tendency to settle into a *compact mass*, which, if suffered to remain, without stirring, through the hot, dry weather, that often succeeds, until the particles of moisture it contains, are evaporated, becomes of the consistence of a *sun dried brick*, and consequently impervious to the roots of vegetables.

THESE things being premised, I shall, without further observations, proceed to the subject matter, and endeavour to enumerate some of the evils inseperably attached to that great error in American agriculture, *shallow ploughing*; beginning with new lands, or those just cleared of wood.

WHAT is the language of our farmers and planters on these occasions? Our soil is not more than two or three inches deep; we must plough *shallow*, otherwise we shall turn up too great a portion of *dead earth*, and ruin our crops; they also say, we must plant *wide*, otherwise a drought will cause our corn to fire;\* and for these supposed weighty reasons, those two practices are almost universally adopted on new lands, to wit: shallow ploughing, and wide planting.

HERE our men of experience prove they are acquainted with the effect, without knowing, or even enquiring into the cause. Their mistaken opinion, respect-

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\* The lower leaves turn yellow.

ing dead earth, will be noticed in due place; but it remains here to be proved, that the necessity of wide planting, is one of the consequences attached to *shallow ploughing*. All plants imbibe moisture from the earth, by their roots; if this portion of their sustenance is withheld, tho' every other species of vegetable nutriment abounds in the soil, the plant becomes sickly, growth ceases, and finally, death ensues. In search of the necessary supply, the roots of plants are extended in all directions, where the soil is open enough to admit them, and to a distance, proportionate to the demand; two plants of the same kind, require a greater quantity, to preserve health, than one: hence it will appear, that a drought of sufficient duration to extract most of the moisture contained in that part of the soil, loosened by the plough, may yet leave sufficient to preserve one plant in health; but if divided, both must suffer, for neither can penetrate the hard unstirred earth below, for a supply. But in case of long droughts, no dis-

tance whatever, will insure Indian corn from suffering, when the under stratum is hard, and the ploughing shallow, and under these circumstances; few summers are so wet, but that close planted corn, at some period of its growth, discovers the want of a full supply of moisture, which perhaps might be amply afforded by one or two inches greater depth of ploughing. They have discovered, that after the first year, several succeeding crops will admit of being *closer* planted: the fact is, that the surface having now been for some time cleared of leaves, rubbish &c. and exposed to the action of frost, sun and dews, that portion of earth, lying originally immediately below the black mould, and called dead earth, which was turned up by the cultivation of the preceding year (for in common soils, it is almost impossible to plough so shallow as to avoid turning up some, in new grounds) has now acquired a dark colour, and therefore not known to be the same; and some of the obstacles to ploughing, being removed, they almost insensibly, go an inch or two

deeper, without shewing any greater appearance of the yellow or dead earth, so much dreaded, than the preceding year : this furnishes a more extensive pasture, \* for the roots of the plants growing therein, and also becomes a more copious reservoir for treasuring up moisture for the needful time ; and consequently affords a supply for a greater number of plants. The second year, is generally found to be much more productive than the first, after which our common lands gradually decline.

THE undecayed fibrous roots prevent much loss of soil by washing, the first year, on lands not perfectly level ; it generally begins the second, and continues annually. The ploughing being about four inches deep, does not afford a sufficient quantity of loose earth, to imbibe the whole of the heavy showers that frequently fall during summer ; the consequence

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\* For want of a more appropriate term, the word, pasture, is used to express the body of loose earth, into which plants freely project their roots in quest of food.

of which is, as before observed, that when the open soil becomes *saturated*, water must accumulate on the surface, and flowing off in torrents, bears away a portion of the finest, and most valuable part of the soil; succeeding ploughings brings to the surface a fresh supply of mould, which in turn follows the last. Thus ploughing and washing alternately, following each other; the original soil is soon deposited in sunken places, beds of creeks, rivers, &c.

THIS waste is in some measure compensated, and fertility continued, by the fresh earth brought up from below; for the plough continuing to pass about the same depth, must of course descend into the unstirred earth, in proportion as the open soil is carried from the surface; but of this the cultivator appears ignorant; the proportion brought up at each ploughing, being small, and soon acquiring a dark colour by being exposed. I am fully convinced, that in many places the surface is now at least the whole depth of the ploughing lower than at first clearing:

Of this we need no other proof, than the half buried posts in low places, the heads of rivers, creeks and mill-ponds filled up, which are every where to be seen in our hilly cultivated lands.

BUT, notwithstanding the before mentioned supply of vegetable earth from below, the soil employed in cultivation, must annually become less fertile ; because the coarse, the heavy and adhesive particles of earth, remain on the spot from the beginning, and those of the same properties contained in the fresh earth brought from below, also remaining, while the finer and more friendly parts, are continually carried away ; at length the proportion of fine soil becomes too inconsiderable, to answer the purpose of vegetation to any degree of profit. Thus the land becomes sterile, not so much from the vegetable nutrient being extracted from the soil by the growth of plants, as by the soil itself being removed : that this is a necessary consequence of *shallow ploughing*, on lands that are in any degree hilly, in

this climate, I trust, has been satisfactorily proved.

ANOTHER material evil that results from the practice of *shallow ploughing*, and which applies to all surfaces, level as well as hilly, is the injury the growing crops sustain for want of a more regular quantity of moisture in the soil: we know by experience, that either extreme is fatal to most of our crops; that the practice is calculated to produce both, at different periods, is evident: for, during a long continuance of *wet*, for the reasons before mentioned, the water must *stagnate* in abundance about the *roots* of the *plants*: and on the contrary, a short continuance of *drought*, extracts nearly the whole of the *moisture* contained in the thin covering of *loose earth*, and it is not to be supposed, that the tender roots of plants in quest of a supply, can penetrate the *compact* earth *below*, which has been hardening ever since its formation.

HITHERTO I have principally alluded to summer crops ; but if we observe the effects of shallow ploughing on winter crops, we shall find the injury still greater. All that has been said, will apply to them in their autumnal growth ; but it is in the spring, and early part of summer, that it often proves particularly injurious, and sometimes fatal to them. Those who have been accustomed to stopping leaks, about mills, &c. know, that earth thrown into water, made to incorporate with it, and then subside, settles into a more solid mass, and becomes more impervious to water, than in any other way it can be applied ; no ramming is equal to it : the same thing frequently takes place in degree, on the surface of our fields. The great rains that often fall about the vernal equinox, drench, and almost render fluid, our shallow worked soils ; the solution of the finer parts, entering the pores, as the water evaporates, the whole settles into a compact mass, and so remains till har-

vest ; for, notwithstanding it may be frequently moistened, yet no other disposition of parts, can be supposed to take place, until operated on by frost or the plough.

THIS state of the soil, is too compact to admit of the free extension of the roots, even when moist ; but, when hardened by droughts, every particle of nutriment not in contact with some of the roots, is effectually *locked up* from the *suffering plants*. So that it often, nay almost always happens, on lands worked in this way, unless very rich indeed, that crops of wheat that look promising in the fall, and early in the spring, begin to decline towards harvest ; and people are complaining of the unfavourable appearance of their wheat : when harvest arrives, the straw is almost too short to cut, and the heads about half the proper length, and those not well filled, yielding six or seven bushels to the acre, where twelve or fifteen might have been reasonably expected, from the quality of the foil : these appearances and products agree with my

constant observation for many years past, especially on early sowed corn ground, damages by fly, rust, &c. excepted.

If manures are applied to shallow worked soils, their good effects in general, will be of short duration, as most kinds must soon inevitably travel the road the virgin soil has, before them.

I SHALL next enumerate some of the good effects to be expected, and which are constantly experienced by a *contrary* practice, viz. *deep ploughing*, when judiciously pursued; and then endeavour to prove the futility of the arguments adduced in favor of shallow ploughing.

IN the cultivation of plants, three things are particularly necessary: First, that sufficient *pasture* is prepared for their roots; secondly, that the soil abounds with proper *aliment*, and thirdly, that *moisture* be duly administered, in neither *too great* nor *too small* quantities. That *deep ploughing* is calculated to promote these ends, I

believe; will not be hard to prove, particularly the first, and third.

THE quantity of earth operated on, being great, it very seldom, if ever, happens, that any fall of rain is so great, as completely to *saturate* it; and until that effect takes place, or nearly so, very little change is to be expected in the disposition of its parts; and therefore when the redundant moisture evaporates, it leaves the soil as it found it, except a small crust on the surface: the succeeding ploughings, instead of being applied to repair the injury the soil has sustained by great falls of rain, go to the further pulverizing and opening it suitably to receive the capillary vessels of the plants. Thus the pasture becomes not only *more extensive*, but far better adapted to promote the growth of plants.

WITH respect to *aliment*, naturalists differ widely in their judgment respecting its nature and composition: my opinion is, that the food of plants has not yet been

fully ascertained by any. This, however, we all know, that manures of all kinds, contribute in some way or other to the growth of plants; whatever may be their food, I will not pretend to say, that it is communicated to the foil by the mode of cultivation under consideration; but this I will say, that it is far better calculated than the contrary practice (shallow ploughing) to retain the quantum originally found therein, or afterwards applied to it; and further, if dews are nutritive, the superior openness of the texture in this mode, qualifies it to derive every advantage to be expected from that source.

✓ BUT, perhaps the most valuable of all the effects resulting from *deep ploughing* is, that it in a great measure preserves an equal quantity of moisture in the soil; for as we seldom have a rain so great, as to produce an unhealthy stagnation of water about the roots of plants set in a foil seven or eight inches deep; so on the contrary, we scarcely ever have a drought of so long continuance as to extract all the

moisture to that depth ; for it is to be remembered, that after a few inches nearest the surface, moisture is extracted, by slow degrees : thus for instance, if it requires one hot day to dry the first inch, probably it will require three, for the second, six, or more, for the third, and so on, perhaps nearly in geometrical progression.

THUS it appears from the foregoing observations, that by this mode of practice the great loss sustained by *washing*, an evil so much to be dreaded in this country, is avoided ; that whatever manures are applied, are safely deposited, and will act with full effect ; that the growing plants are abundantly supplied, during the whole of their growth, both summer and winter crops, with an open soil, for a free extension of their roots, and also, with a regular supply of moisture ; so that their growth is at no time impeded by any small irregularity of season ; the depth of soil being to them, with respect

to wet and dry, what the ocean is to small islands, with respect to heat and cold; the means of a tolerably regular temperature.

I CAN readily anticipate the remarks of our sticklers for old practices, on what has been advanced. This reasoning (say they) well applies to rich deep soils; but in poor shallow soils, “let him beware of the *yellow clay*, the *dead earth*, lest the value of his land proves to be the price of his too adventurous experiments.” But let me ask them, have they never seen the effects of earths taken out of cellars and wells, when applied to poor land? have they never observed the luxuriant growth of grass and weeds, at the edge of a bank, taken from a mill-race, or large ditch, and frequently on the very top, when flat enough to retain moisture? for my own part, I have long been in the habit of observing these things, and do not recollect that I ever saw any earth taken from a considerable depth below the surface, which

was capable of being pulverized by frost or tillage, without evident advantage, even when clay has been applied to clay, and sand to sand. Seeing this is the fact, is there any good reason for supposing, that, as we ascend toward the surface, such a difference will be found in the properties of the earth, that this will render the same land sterile, that the other will enrich? I confess I see none; I cannot even see, why we may not with propriety suppose, that the first six inches of earth next below the usual ploughing, should be possessed of all the fertilizing qualities, that the same kind of earth would be, if found six feet below.

It would seem then, that by this mode of cultivation (*deep ploughing*) on exhausted lands, the quantity of soil would not only be increased, but actually enriched. On lands, covered with two or three inches of rich mould, it will probably have a contrary effect in some degree, yet even in this case, the advantages result-

ing from an encrease of quantity, will be found abundantly to overbalance the small abatement in quality.

THEIR prejudices, in all probability, have proceeded from injudicious experiments; very few planters break up ground in the fall; in the spring their teams are often weak, and were they dispos'd to plough a spot deeper than usual, would very likely choose to do it when wet, on account of its being easier performed; soon after which the crop is to be planted or sowed, which proves the worse for the experiment, and the planter is disgusted with the practice: he informs his neighbours of the ill success of his experiments; and perhaps, a whole neighbourhood is thereby afresh confirmed in their former belief that the good old way is best—to plough as deep as they find black soil, and no deeper.

PLoughing land that contains a considerable portion of clay, in a state

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*too wet* to break, as the furrow leaves the plough, is, thereby, rendered more *compact*; and when hardened by the sun, becomes entirely unfitted for the production of vegetables; and is scarcely to be reduced by any succeeding tillage during the same summer; indeed, I believe, nothing short of a *winter's frost* will effectually *pulverize* it. The best devised system of practice, may be rendered entirely abortive, by being put into the hands of unskilful practitioners to execute.

LANDS that are to be ploughed much deeper than usual, ought to be broken up in the fall; and would be the better to be ridged, that more surface might be exposed to the frost: If omitted till spring, it ought to be done as soon as it becomes dry enough to break freely before the plough: No crop should be put in that season, that requires to be seeded before it can have several ploughings and harrowings at proper intervals; otherwise, the expectation of the cultivator will probably be blasted.

IF, notwithstanding what has been advanced, I should be called upon for proofs—should be told that the evils complained of on one hand, are, in a great measure, ideal; and that the advantages proposed on the other, are theoretical, and remain to be confirmed by practice. With respect to the first, it would, perhaps, only be necessary to say—what further proofs need we, to convince us that the practice of agriculture, particularly in the southern states, is miserably defective, than the deserted old fields that so frequently present their disgusting surfaces from Susquehanna to Georgia? Some years ago I was of opinion, that this speedy reduction of soil, was altogether occasioned by the nature of the crops cultivated thereon; but, on attending more accurately to the subject, I am of a different opinion, and believe, as I have already said—it is more from the *manner of cultivation* than from the *exhausting properties* of the crops; of this, one thing has tended to convince me; I have observed, that when an industrious person,

from another state or country, where the cultivation is generally *deeper*, has settled on these exhausted lands, that they frequently improve for some years; although the *same crops*, or those equally as *exhausting* are cultivated; and, instances I have known, of some of these old fields becoming very productive without manure.

**A**LMOST every summer furnishes abundant proofs of the great disadvantage of the practice of *shallow ploughing*, to both summer and winter crops; if we were but disposed to open our eyes and look for them. A very curious one lately happened on my own farm.

**A** FIELD was sowed with wheat by a tenant, the ploughing from three to four inches; a deep hollow extended across part of the field, in a direction nearly east and west; the side exposed to the north tolerably good, the south exposure very rich; as might be expected, the wheat on the strongest soil made

the most promising appearance in the fall, and also for some time in the spring; in the early part of which clover seed was sown on the whole, which came up well; a drought came on late in the spring; the south exposure *drying first*, the wheat soon showed the effects of it; and, the drought continuing, a considerable part entirely *perished*; the north exposure also suffered, but being more shielded from the action of the hot sun, was not so effectually dried. At harvest it was much the best wheat, notwithstanding the superior richness of the soil on the other side. A still greater difference appeared in the young clover; on the south hill side it was almost entirely killed, on the other very little injured.

I HAVE had some experience of the beneficial effects to be derived from *deep ploughing*; but the obstructions in most of my fields (particularly large stones just below the surface) have prevented my adopting the practice so fully as I could wish; yet the success that has always

attended my experiments, in conjunction with my observations on the practice of others, has been conclusive evidence to my mind.

IN the year 1795, I took possession of my present farm, and had a field ploughed for wheat, which had been thought for several years before, too poor to cultivate, either in wheat or Indian corn: I saw rye growing on the best part of it, two years before, just before harvest, that I think would not yield two bushel to the acre. It was ploughed early in the spring, about eight inches deep, and repeated with harrowings, at proper intervals, several times during summer; it was sown about the last of the ninth month. The soil being weak, the growth in the fall was slow, as also in the spring, yet regular, the colour always good and no appearance of suffering, either from *drought* or *wet*; at harvest, the straw was not tall, nor thick on the ground, but the heads large and well filled; the product, between sixteen and seventeen bushel per acre, except a part

of the field, sown with a kind of wheat I was not before acquainted with, which was too thin, in consequence of a short allowance of seed. I observed the state of the soil, from time to time, until *harvest*, and found, that even *then*, it was open and in good tilth, except a crust of two or three inches, next the surface.

IN the spring of 1796, with a large plough and four horses, I broke up part of a field; I measured the ploughing frequently, and found it in many places eleven inches deep, and no where less than seven; so that the average was at least nine. This piece contained about four acres, on a gentle declivity; the surface too much exhausted, to pay for cultivating any crop in the common way: this ploughing brought to the surface about five inches of earth, that had never before been exposed, which was principally clay; at the upper edge of the piece, of a bright yellow, which became gradually paler, further down, and of a bluish appearance near the lower side. After several stir-

rings, it was sown with buckwheat the same year; the crop tolerable; after the buckwheat came off, the ground was ploughed and sown in rye, in the eleventh month, very little of which came up, owing, as I suppose, either to its being too late put in the ground, or the seed not good. It remained without further tillage, until last year (1800) when it was again sown in buckwheat, which grew so large, as generally to fall. Before it was ploughed in the spring, I took several of my friends to see the difference in the appearance of this piece and the ground adjoining, that had lain the same length of time out of tillage; it was discernable to a furrow; the *deep-ploughed* piece appeared of a fine open texture, and dark colour, thick set with white clover; the adjoining ground, compact and hard, of a *pale* ash colour, bearing scarcely a blade of any other kind of grass, than that common to old fields, known by the name of poverty-grass: In short, one had the appearance of an exhausted old field, and

the other of land lately manured. Those who expressed a sentiment on the subject, were of opinion, that to those who did not know what occasioned the difference, the *deep ploughed* piece, would sell for double the price of the other.

PART of another field, from having a very retentive clay near the surface, was of that kind called cold, or sour land, and was thought unfit to produce any crop; either water or ice generally appearing on the surface, in an open time in winter. This was so thick set with white flint-gravel and stones, that the first ploughing could not be deep; but having cultivated several crops on it, taken off the largest of the stones, and consequently been able to get a little deeper at each succeeding ploughing, the nature of the ground seems altered, so that now there is seldom either water or ice to be seen on its surface, more than is common to other places: It is now in

red clover, very little of which has been injured by the late open winter. This piece has been manured ; it is therefore, unfair to ascribe the quantity of the crops, which have been good, to deep ploughing only ; though I am of opinion, that on such land, manures are not of much consequence without it.

I MIGHT have before observed, that one of the objections that will probably be made to *deep ploughing*, is the greater strength of team that will be requisite to perform it, and consequently an additional expense. This I believe, on consideration, will also be found to be without foundation. True it is that the first ploughing requires more strength of team ; but then it is equally as true, that if the plough is a good one for the purpose, almost double the quantity will be performed in a given time. The four acres above mentioned, was ploughed by four horses in less than two days ; the furrows averaged seventeen inches in

width. And as ground ploughed in this way will not acquire the same degree of firmness for many years afterwards, although it should remain untilled ; it will be found, that three horses to a plough will be sufficient for after ploughings, even for a grafts-lay ; and that two such teams will perform as much in a day as six horses in three ploughs of the common kind, and of the common description of ploughing. Here then is a ploughman saved. In addition to this, it is to be remembered, that for reasons before given, land cultivated in this way, will be preserved in good tilth with much fewer ploughings than in the other mode.

THUS, let the subject be considered on whatever ground we choose to take it up, either with respect to the preservation of the soil, the quantity of produce, or the quantum of labour bestowed, the advantage is greatly on the side of the method proposed.

BUT, let me again repeat it, that those advantages depend in great measure on the manner of performing it. It must never be forgotten, that ploughing when the soil is very dry, is of no other consequence than to destroy weeds ; but when over wet, in stiff soils, the mischief is incalculable ; it is at least irreparable for that season.

IF any should be still disposed to condemn the forgoing observations untried—to say, that if those extraordinary advantages will result from *deep ploughing* that are ascribed to it, they certainly would have been long ago discovered, and the practice universally adopted ; that a great proportion of the inhabitants of the United States, being engaged in the business of ploughing nearly one half of their time, it is not reasonable to suppose those things could have escaped their observation.

As a full answer to such, let me call their attention to some of the absurd practices that the best of our cultivators are but just emerging from ; and that probably they themselves remain in ; let them view their own practice in these things, and then say, whether they feel that consciousness of perfection, that will justify them in condemning proposed improvements without trial.

LET them reflect a moment on the propensity that almost every planter feels for clearing a piece of land every year, which is very commonly continued until there is little or no wood left, either for fuel or fences ; and very often it happens that in the latter stages of this erroneous conduct, more than half their cleared land is so far exhausted, as not to be worth cultivating ; more acres of which, than they annually clear, it is amply within their power to reclaim and render as fertile as ever it was, and that with half the expense ; yet strange to tell,

every acre is neglected, while the clearing business is pursued with avidity, until at length, the fatal blow is struck, and necessity compels them to part with their murdered estates for a trifle, and seek refuge in the Western country. Witness, some of the lower counties of Maryland and a great part of Virginia.

LET them reflect on the immense labour that has been bestowed in the Southern states, in the business of raising great hills about Indian corn. It is now acknowledged, with good reason, by many of the best planters, that it is altogether useless in promoting the growth of the corn; but say they, it is absolutely necessary to raise a small hill, to prevent the corn from falling, by storms of wind and rain. Let us try the wisdom of this improved mode. Every one who has paid attention to the growth of corn, must have observed, that before, or about the time it arrives at the state of danger, it is sure to send out a circle of strong

roots just at or a little above the surface ; these are the supports of nature ; and so well are they adapted to the purpose, that we seldom see a stalk torn up by the roots, except where the earth is previously washed from about them. If let alone, there is no other danger to be apprehended than from the breaking of the stalks, which indeed, sometimes happens, and which hilling does not prevent. If it is bent down by wind and rain, when the wind ceases and the blades are released from their burden of moisture, it will of course rise. But the officious planter must do something to assist nature. He accordingly raises a hill ; how does it affect the plant ? Let him observe it soon after, and he will discover he has mistaken his aim ; that nature, feeling herself thwarted, is endeavouring to repair the injury, by retaining a part of the *nutritive juices* provided for the support of the shoots above, for the purpose of sending out a *new set of braces* above the *new raised hill*. This takes

time, and frequently before they new roots have taken hold in the earth, a gust of wind and rain comes on ; the consequence of which is, that the hill soon becomes softened by the rain, and the wind at the same time pressing the stalk against it, it gives way and leaves an opening behind the stalk ; this opening is instantly filled by the rain beating the earth into it, and the stalk secured as far as it has gone ; another blast forces it still lower, and the same effect succeeds behind it ; when the storm is over, we find the stalk fixed precisely at that point of depression, at which the hardest blast of wind left it, after the hill became wet. This is the present *improved* mode of hilling corn.

LET them reflect on the present mode of supporting their stock, which is principally from the *corn-house* ; by neglecting the culture of *grasses*, the stock is maintained (if well maintained) at more than *double* the expense that it might be

by a proper attention to grass ; and the land at the same time reduced to *poverty*, that would otherwise be *enriched* by such attention.

Now my friends, view yourselves impartially in the mirror thus held up to you, and I believe you will cease to wonder, that you have not long since discovered the advantages of *deep ploughing*.

✓ HITHERTO I have treated of the beneficial effects to be derived from *deep tillage abstractedly*, and no further than abundant corroborating proofs will substantiate ; but believing as I do, that if ever a material reformation takes place in *American agriculture*, that this will be the *basis* ; I am induced to offer a few hints for consideration, respecting the probable advantages that may be derived from the practice, when combined with other necessary improvements ; such as a due attention to manures, rotation of crops, &c. &c.

By a proper attention to these things may we not reasonably hope for the speedy fertilization of thousands of acres of exhausted old fields, that now will not pay for enclosing? To effect which I would propose, that the *system* by which they have been reduced to their present state of *poverty*, be in all points *reversed*. They have been reduced by SHALLOW PLOUGHING, an *ill-chosen* rotation of crops and a total neglect of manure. Let them be recruited by DEEP PLOUGHING, a *favourable rotation*, and *all the manure* which the best management will afford them. My plan would be this; break up the ground in the fall, ploughing at least eight inches deep; if level throw it into ridges, if hilly; begin at the base and surround the hill, if the situation will admit; if not, turn a furrow down the hill and let the plough return light; for if the furrows are attempted to be turned against the hill, it will not be effectually done, and the whole business will be thereby marred. In the spring, plough

and harrow as often as convenient, or the state of the ground seems to require ; always keeping to the same depth : If a sufficient quantity of manure is in readiness, the last ploughing should turn in from twenty-five to thirty large cart-loads per acre ; then plant with potatoes ; after they are dug in the fall, either sow down in wheat, and early in the spring red clover-seed ; or let it lie over winter, and sow in the spring, barley or oats and clover.

IF manure cannot be procured the first spring, let not the industrious improver be discouraged ; but instead of potatoes, substitute some *shading crop*, that does not require so much strength of soil ; such as peas, beans or buckwheat. I have no doubt that if the foregoing instructions are attended to, on ground that has ever been tolerable, that one or other of these crops may be cultivated to profit : This will also better prepare the ground for the next year's opera-

tions, by which time it is presumed the cultivator will be furnished with manure to proceed as before mentioned. In planting potatoes on hilly ground, or any other crop set in rows, and requiring to be ploughed or hoed whilst growing, more attention should be paid to the rows being horizontal, than in straight lines, as being more favourable to derive advantage from hasty showers, and also to prevent washing. In most situations and soils it will be found that the clover will be much improved by the use of plaster of Paris, as a top dressing, and ought not to be neglected when it can be procured.

If by these means a good swarth of clover is produced, I consider the land as reclaimed ; for I know of no better preparation for a crop of wheat, than a clover-lay well turned, after being mowed two years ; the wheat sown on the ploughing and harrowed in,

LANDS once reclaimed by these means, will by a similar course of management, that is, by *deep cultivation*, a *well chosen rotation*, and *manuring* as often as practicable, be kept in fine tilth with much *less labour* than in the present mode. May we not then expect by a proper attention to these interesting considerations, great improvements in the cultivation of Indian corn, tobacco, potatoes, peas, beans, &c? We have found by experience, that these crops particularly, require the soil to be kept open and clear of weeds during their growth; in order to effect these purposes, the common practice with respect to corn is, to plough and cross plough frequently, three or four inches deep, until about the time of tasseling or blossoming; in addition to which, many hill several times, and nearly all once at least: The other crops are mostly ploughed, and almost universally hilled. But provided we can attain these ends (viz. the destruction of weeds, and an open soil) by other means, are those

practices rational? Any one who will be at the pains to search, may easily discover, that the roots of corn soon extend themselves a considerable distance from the hill; by the time the top is knee high the roots are extended nearly from row to row (if not too frequently cut off by the plough) though so small as to be scarcely visible.] Is there any good reason to suppose, that nature requires those numerous organs, prepared for the express purpose of supplying the rising plant with sufficient nourishment, to be so frequently mutilated, as must always happen in ploughing? thereby not only depriving the plant of that quantum of supply contained in the amputated vessels, but also of all future supplies by the same sources. ✓

TRUE it is, that above ground we frequently find it necessary, apparently to oppose the operations of nature in some measure, in order to bring her to act more consistently with our views. For instance, fruit trees, and many kinds of plants that bear their fruit upwards, often

project so many branches and suckers, that notwithstanding the fruit may be thereby encreased in number, yet we find it necessary to lop off a part, in order that the whole of the nutriment may be applied to the remainder ; improving the quality, and frequently encreasing the quantity thereby. But, that it is necessary to diminish the roots that supply the nutriment, I believe has never been proved by any experiment.

YET nevertheless, we constantly see the good effects of frequent ploughings ; the reason is obvious ; in the common mode the ground becomes too solid in a few weeks, sometimes in a few days, for the roots to penetrate, and therefore it is better for the plant, when all its vessels of supply are embargoed, to part with one half, if thereby admittance is obtained for the other half to act freely. So that it may be fairly said, in the culture of Indian corn, of *two evils*, we choose the *least*. The important question

is, how shall we avoid *both*? May I not answer, by attending to the foregoing instructions ?

A SUITABLE rotation, and the necessary preparation of the ground before planting, will so far clear it of weeds, that one or two ploughings and as many harrowings afterwards, will complete that business ; all which may be done by the middle of the sixth month, without material injury to the roots, as the corn at that time is seldom more than a foot in height. If these ploughings are of the depth before mentioned, there will not be the least danger of the soil becoming compact for a few weeks, until the growth is so much increased, as almost completely to shade it ; after which it will need no ploughing to keep it open. This effect will generally take place in this state about the middle of the seventh month ; for it is to be remembered that in this mode, it may be planted much closer than in the common way ; the

number of plants not being estimated so much from the surface as from the quantum of soil employed, as before hinted ; for instance, if one plant requires a yard square of soil, of three and a half inches depth, the same surface, will be more certain to bring to perfection two plants, when worked seven inches deep ; experience having proved, that in some particular rich deep soils, corn will admit of being planted four times closer than is usual, without suffering from a want of air. Thus it is probable, nay experience has already reduced it to a certainty, that *half the ploughings* usually given to corn, may be made to produce *double the quantity on the same ground* : What an immense saving of labour ! What an immense saving of land !

MUCH of what has been said with respect to corn will apply to the other crops ; but as they are more generally *hilled*, I am willing to express a sentiment on *that practice* in general.

IT has long been a matter of doubt with me, whether any kind of crop we cultivate requires this mode of tillage, except it be on low grounds, merely to avoid too much wet ; and the greater opportunity I have had of making observations, to ascertain the fact, the more I have been confirmed in the sentiment. I believe it will always be found that nature disposes plants to make the best of their situation ; to project their roots at such distances from the surface, and in such directions as are best calculated to extract their food from the surrounding soil : is it not then reasonable to suppose, that in removing the earth from the *extremities* of the *roots*, and heaping it about the *body* of the *plant*, we more or less *derange* the *economy* of *nature*? and instead of aiding we involve her in difficulties not to be surmounted, but at the expense of a part of her *vital secretions*.

I HAVE examined the vines and roots of potatoes that have been much hilled,

which plainly showed, that no less than three different sets of roots had been projected at as many different times, designed by nature to bear the fruit ; the first and second having bulbs as large as peas or gooseberries ; the third and nearest the surface bearing the burden of the fruit : These last springing from a part of the vine that must have been *above* the surface before the *first killing*.

FOR notwithstanding the fibrous roots extend as deep as the fine open soil, the potatoes incline to lie about four or five inches from the surface. The shape of the hills or ridges, are also unfavourable to the retention of moisture. I have frequently seen potatoes dug that have been manured in the roots and several times hilled, which appeared to have derived very little advantage from the manure, which has been turned out dry, and nearly in the same crude state in which it was applied, not having received moisture sufficient for the purpose of fer-

mentation. The best potatoes I ever had, were produced with scarce any hilling, the ground being kept open by other means, the same thing I have known to happen in the practice of others.

HAVING mentioned that within certain limits, exhausted lands may be reclaimed at half the expense that new lands are cleared, and also the quantity of manure that I apprehend necessary for the purpose, it may perhaps be expected, that I should say by what means such a quantity is to be collected, and also point out the favourable rotations before alluded to.

WITH respect to these much might be said, in addition to any thing I have seen published, especially on the subject of manures ; but as they have already engaged the attention of many of our citizens, and as my present views are not to enlarge on subjects treated by

others, but briefly to suggest a few things which appear to have escaped notice, or at least that attention I have believed their importance required; I shall say little on these subjects; but recommend enquirers to some small tracts written in our own country (to wit) G. Logan on rotation of crops—J. B. Boardly on the same\*—and Richard Peters on Gypsum.†

BUT as it may not be practicable for all to be furnished with these authors, I will endeavour to sketch the outlines of what I think good management in these respects.

\* SINCE writing these remarks, I have been informed that J. B. Boardley has published a considerable volume on agricultural subjects; but not having seen any of his writings, except his sketches on rotation of crops, I can form no opinion of the merit of the others.

† I AGREE with this author, as to the liberal use of this manure, but have taken the liberty of offering a theory of my own, with respect to the manner of its operation, as will be seen in the course of this essay.

IN the first place, house as many of the stock as possible throughout the winter, always keeping them well littered. Cattle that are not housed should have all their food given them in the barn-yard, which should be so constructed as to prevent any wash passing away from it ; an excavation should be made in some part of it, and always well supplied with mulch of some kind ; such as refuse straw, weeds, corn-stalks, rich earth or leaves from the woods, or several of them together, in order to imbibe the soakings of the manure thrown out of the stables, and also that which lies on the higher parts of the yard. All kinds of refuse substances capable of being converted into manure, ought to be thrown into the yard : The manure should be carted out in the fourth month and the yard again littered. If a considerable part of the materials remain unrotted when taken into the field it is not to be regretted, only let the quantity be the greater, and have it immediately ploughed in ; for I

am clearly of opinion, that the putrefying fermentation, can no where be carried on to so much profit as in the soil.

My management for two years past has been very indifferent, yet I have been enabled to manure one acre for every three head of grown horses and cattle, kept over winter, and nearly one from the hog-pen. The land it was applied to, with common cultivation without manure, would not have produced one barrel (five bushels) of corn to the acre ; with the manure and tolerable cultivation, it produced six barrels. If it had been applied to land already in tolerable heart, I believe the proportional increase would have been much greater. This year my management has been better, but far from perfect, yet I expect to manure nearly an acre for every two head, at least I am certain the thing is practicable.

THE principles upon which good rotations are founded, are these : That the

naked soil be as little as possible exposed to the heat of summer; that ameliorating crops, so intervene exhausting ones, as to prevent a speedy reduction of the soil, and that the preceding crop should prepare the ground for the next that is to succeed it without much labour. Thus, for instance, a crop of beans or potatoes, prepares the ground for wheat, to be sown as soon as they are taken off: Indian corn or potatoes prepares for spring-barley and clover; and clover prepares for wheat: Buckwheat may be sown on wheat stubble, which cleans the ground for corn with manure the succeeding spring. These may be varied as best suits the soil, situation, or market, always keeping the first principles in view.

ON soils inclining to stiffness, pasturing ought to be avoided as much as possible, and cutting and feeding green, substituted. The injury by treading on such soils, particularly when wet, is more

than many are aware of. I have run a fence across a field set in clover, one side of which was afterward mowed two years, two crops each year; the other was pastured the same length of time, principally by beef cattle, which continued in the field day and night, and consequently deposited their dung there; these divisions were both sown down in wheat, in the tenth month; the part that was mowed, with one ploughing about seven inches deep, and harrowed in: It was observable in the latter part of summer, that the part pastured, was become too compact to be reduced by one ploughing and harrowing; it was therefore broken up in the eighth month; afterwards harrowed, then ploughed again about the same time with the other, sowed and harrowed in; the ploughing likewise about seven inches. At harvest, both sides of the fence were good, but the part that was mowed, much the best, I believe about five or six bushels per acre.

THUS, all my experiments and observations have uniformly tended to establish one fact, which is, that in order to insure success for a length of time, it is necessary that the soil be kept in fine tilth, and that to a considerable depth. In some parts of our rich Western country, nature seems to have effected this purpose, in great measure, without the labour of man: The earth being here covered with a fine black mould, to a greater depth than the deepest ploughing. As long as it continues in this state, the operation of the plough and harrow, will be of little other use, than burying the seed and destroying weeds. There are also two other kinds of soil, frequently to be met with in the Atlantic states, which are often preserved for a great length of time in a state favourable to vegetation, without much attention; these are, the fine black sandy soil, and the soil that abounds with calcareous earth, or lime-stone lands: Yet even on these, I believe we should find our account in a *deeper cultivation* than is usual.

But by far the greater part of our country, is of the kind alluded to, in the foregoing remarks.

SEEING then, such a state of the soil is absolutely necessary, it becomes the great, the most important business of the husbandman, in the first place, to produce it, and then to perpetuate it by all the means in his power. I am far from believing, that these ends can always be profitably attained by means of the plough only; but that more depends on the judicious use of that instrument, than has generally been supposed, I trust, has been demonstrated. It is scarcely needful to add, that a fertile soil is always of a dark colour, and soft to the touch; and whatever applications will produce this appearance and texture, is a manure. I shall here offer a few observations on the extraordinary effects of plaster of Paris or gypsum, leaving others to judge, whether this effect on the soil, is not to be considered amongst the principal virtues of manures in general.

THE great effect of this wonderful substance, is visible to all; but the manner of its operation is mysterious. Among the various conjectures respecting it, some have pronounced it a powerful stimulus, which putting all the vegetative powers of the soil in action, produces one great effort, and afterwards leaves the soil barren. This reasoning (if it may be so called) upwards of twenty years experience; has proved to be fallacious. Others, with greater plausibility, have attributed to it, an attractive property, whereby vegetable nutriment is extracted from the atmosphere; and some others say, mere moisture only, is attracted; as a proof of this attractive property, they adduce the fact, that dew is to be seen later in the morning on grass that has been plastered, than on the adjoining that has not.

THIS theory (tho' apparently plausible) in my view is not without insuperable objections. I would ask in the first place, what change it undergoes in the

foil, that disposes it to attract moisture more copiously than when above ground? I have not been many days without having some of it in a pulverized state in my possession, for several years, and have often looked in different kinds of weather, for that effect, and have as often looked in vain: I have never seen any thing like moisture about the substance itself, nor the vessels that contained it, neither in damp nor dry weather, more than was common to other substances; on the contrary, I have sometimes dampened some to sow, and have found it inclined to dry very quickly. It is well known, that on lands where the proportion of clay is great, it has no perceptible effect: I have also found, as well as some others, that where applied to a fine mellow soil, the effect is very little: if it operates by attraction, why not attract here, as well as in other soils? certainly both would discover the good effects of a supply of moisture in a dry time.

I WOULD suggest for consideration, whether its effects may not be satisfactorily accounted for, on the *principle* before alluded to, as the *basis of agriculture*, a mere preparation of soil; without ascribing to it, either stimulant or attractive properties, other than the promoting a fermentation in the soil, which may be called stimulant.

ON a chemical investigation of the properties and composition of this substance, two things are discovered; first, that it is soluble in water, but that the solution is remarkably slow; and secondly, that it contains a very great proportion of vitriolic acid. In applying it to the soil, I have observed, that no visible effect takes place, until after some rain has fallen subsequent to its application; that the finer it is pulverized, the quicker the effect, and the shorter the duration; the fine dust blown from the hand at the edge of the sowing, or between the casts, sometimes producing as great an effect the first sea-

son, as any greater quantity, but intirely ceasing afterwards; while the middle of the casts, where most of the coarser parts fell, will show the effect for several years, giving the crop a striped appearance: that where the foil contains a large proportion of clay, it has no perceptible effect; and that on a fine mellow foil, the effect is but very little, sometimes not perceptible. These observations I expect, have been common to many practitioners; from which I infer, that it is first slowly dissolved by the rains; that after solution, decomposition takes place in the foil; and the vitriolic acid being thereby set at liberty, to combine with any other base it may find in the foil, effervescence or fermentation (a well known effect of chemical combinations and decompositions) is from time to time produced; thereby separating the parts of the foil, and giving it that appearance and texture, which is common to all rich foils; and that this state always exists, where the gypsum takes considerable effect on the growing crops, I am bold to

assert: In general it is very visible on the surface, but always by passing through it with the plough.

I MIGHT here risk an opinion, why the application of plaster to clay, fails of exciting a sufficient degree of fermentation, to effect a separation of its parts; but as I by no means profess a critical knowledge of chymistry, shall leave it to others better versed in that science, to assign the cause, and only assert the fact, that by such applications the tenacity of the soil is not destroyed, or any visible effect on vegetation produced. In an open mellow soil, great effects are not to be expected, because the state which the plaster is calculated to produce, already, in great measure existing, leaves it little to do.

BUT it will no doubt be queried how I account for the appearance before mentioned of the dew remaining longer on the grafts, where the plaster has taken ef-

feet, than where none has been applied ? To this I answer that it is not in consequence of a greater quantity falling thereon, but because it is more slowly evaporated. Whoever will be at the pains to examine, will find, that this appearance is not confined to the plaster ; but that grass growing on ground made rich by any other means, will show the same difference, when compared with the same kind, growing on poor ground along side of it ; or if observed when the sun shines after a shower of rain (when both must be effectually wetted without attraction) the same thing will be seen, and is easy to be accounted for on philosophical principles. The soil upon which the grass grows luxuriantly and retains the moisture, is always of a darker colour and softer texture, than the poor soil adjoining : it being therefore more fitly adapted to imbibe the solar rays, they pass freely into it, while they are plentifully reflected back from the hard light

coloured poor soil, on the drops of moisture suspended on the grafts, operating in the same manner as the rays of heat from a reflector placed behind roasting meat: Add to this that the grafts always grows thickest on the rich soil, which will also contribute to *prolong* the drying operation.

WHERE this manure has great effect, it in some measure answers the purpose of *deep ploughing*; many having discovered that *washing* ceases where it is frequently applied with advantage to the crops. This is a certain proof that the soil is opened to a sufficient depth to imbibe the whole of the heaviest rains, and thereby prevents the accumulation of water on the surface: Hence we may safely conclude, that its operation continues much deeper than the usual ploughing. This is the secret which has prevented some Pennsylvania improvers from discovering the uecessity of deep cultivation. I have been told that some great *plaster users* when consulted on the subject of

deep ploughing, have answered, that their crops have succeeded well with the usual depth, and therefore have not seen the necessity of going deeper. But let them cease to use the plaster, or confine their operations to a soil where its effects are inconsiderable, and then, after a fair trial of both methods, if they do not see cause to change their opinion I am very much mistaken.

JUDGING from the experience we have had of this manure, the judicious use of it is certainly to be recommended, while it can be had at the present low price. I prefer using it as a top dressing for upland grasses, at the rate of from three pecks to a bushel per acre. But those who substitute it for every other kind of manure and neglect all other means of improving their lands, will probably one day find that they are not so far advanced in agricultural knowledge as their present success may lead them to suppose.

I AM acquainted in some neighbourhoods, where the farmers are fast increasing in wealth ; their crops having nearly doubled within seven years, and the face of the country astonishingly changed for the better ; and yet I do not believe they have made much progress in substantial agricultural knowledge. Accident has put them on the use of *gypsum*, and this has done every thing for them that is done ; if accident should again deprive them of it, they will probably, in a few years, find the quality of their soil and quantity of produce nearly the same they were before the use of it.

THIS however is far from being the case with all who are in the practice of using it ; there are in America, men of observation, of genius and industry, who are making the best use of this valuable foreign manure, while it is in their power ; but at the same time, are paying such attention to the principles of agriculture in general, that if this should be immedi-

ately withheld from them, they would nevertheless, be found in the high road for improvement, and some of them perhaps already in possession of the secret, of preserving their farms for any length of time, in a productive, and even improving state, without any foreign assistance whatever.

BEFORE I leave the subject of gypsum I would just observe, that although I think highly of Richard Peter's publication on this subject in general, yet I cannot unite with him in believing it a " whimsical substance ;" on the contrary, I believe it to be as perfectly regular in its operations as any other manure, when applied to soils upon which it is capable of acting. The quantity of moisture it receives, will no doubt, in some measure govern the effect, but this I believe will be invariable : the same causes in this, as well as other manures, uniformly producing the same effects : In short, I have never yet seen any of its effects or fail-

lures, but what may be accounted for by the foregoing theory.

I HAVE recommended some agricultural publications written in our own country, in preference to any European authors, because I think they are more to be relied upon in American practice. General principles are the same in all countries ; but in their application, the soil, climate, and a number of local circumstances, ought always to be taken into consideration ; to which it is but too evident my countrymen have not been enough in the habit of attending.

IN Great-Britain, their practice is acknowledged to be more perfect than in any other part of Europe, and yet a late author is of opinion, that their tillage land in general, does not produce more than one third of what it is capable. They are not subject either to the excessive heavy rains, or hot dry weather that we are ; absolutely requiring with us, a greater depth of cultivation to counter-

act the bad effects of the climate on the soil; and yet their ploughing is deeper than ours; and the probability with me is, that this remains to be one material point in which they have yet to improve. I am told that about London and other places where land is very dear, their gardeners find their account in once at least, stirring their ground from two and a half to three feet deep.

I SHALL conclude these remarks, with observing, that although I think *deep culture* a matter of the first importance in this climate, yet there are other subjects which ought to engage our attention more closely than the appearance of our country indicates they have hitherto done. Among these are an economical choice and consumption of crops, for the support and fattening of live stock, and methods for the saving of timber. With respect to the first, it is certain, that one half the ground, and half the labour, generally appropriated to the purpose, is

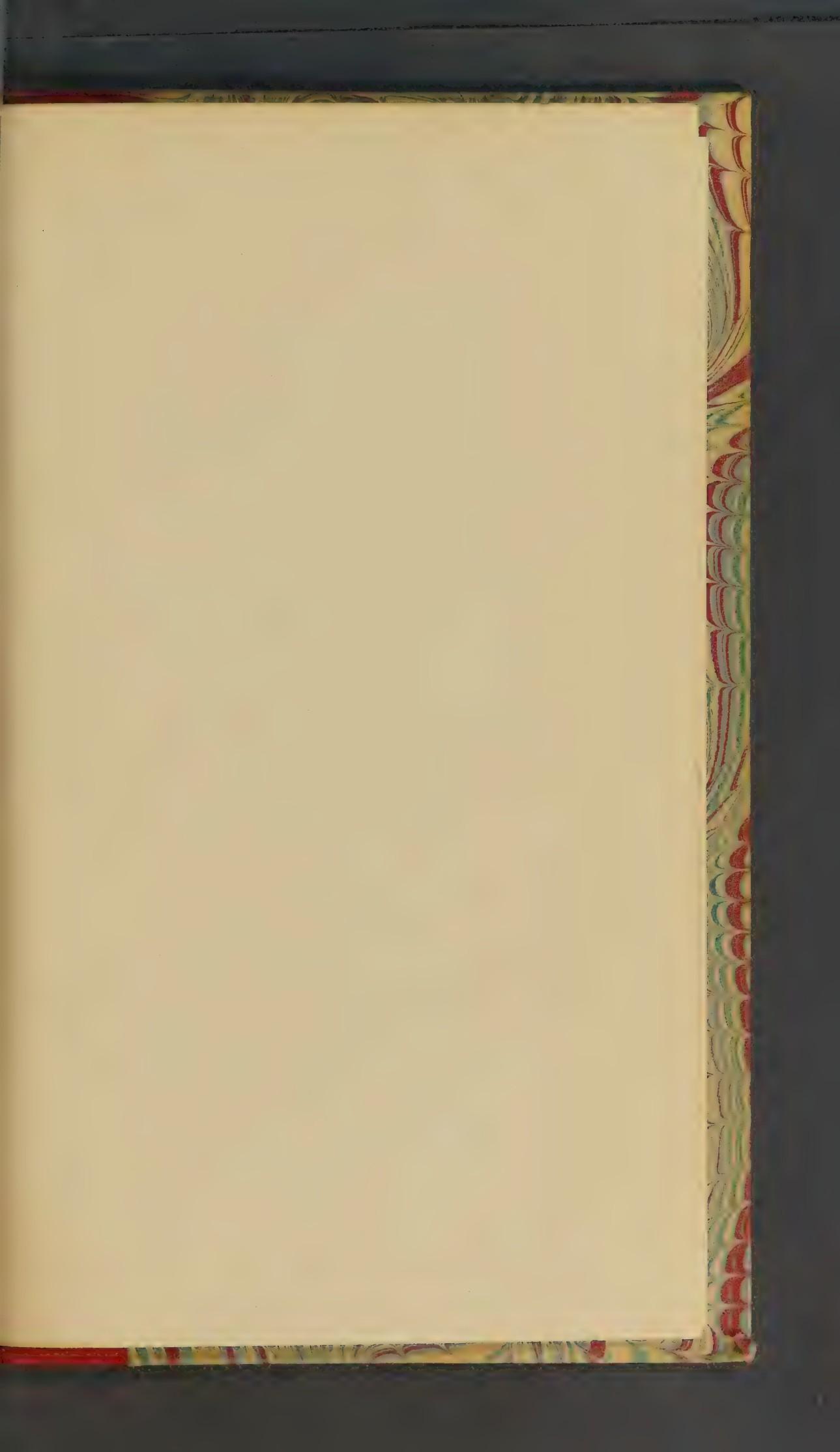
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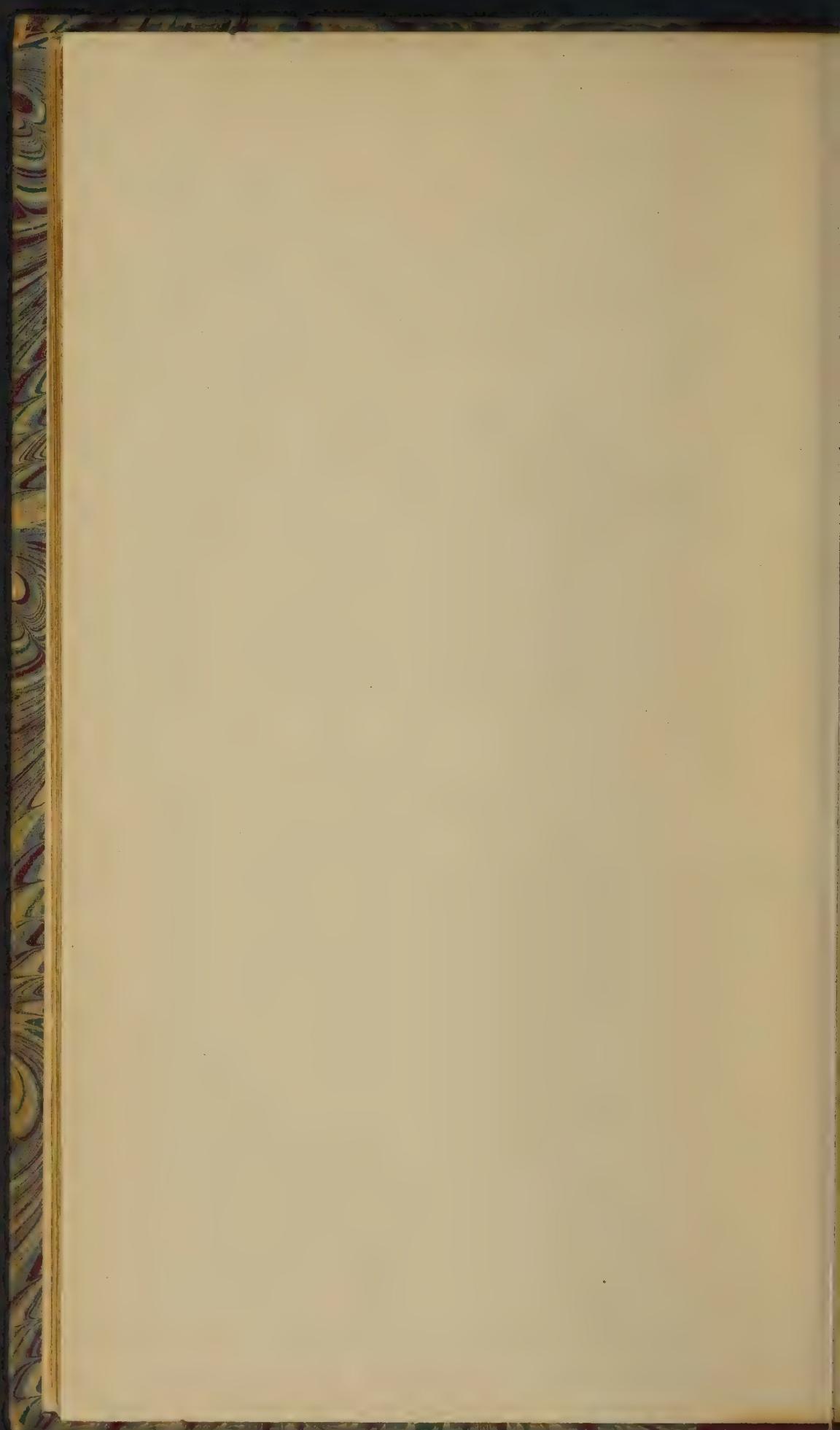
amply sufficient ; or what is the same thing, the same ground and labour may be made to support and fatten double the number. It is also demonstrable, that half the quantity of woodland generally thought necessary for fuel, fences, &c. will, with proper management, be sufficient ; this will also be a saving of labour in nearly the same proportion. But as I have already exceeded the limits at first contemplated, and very probably have written more than some who have the *most need* will be willing to peruse, I shall at present spare myself the labour of adding any thing further on these subjects ; and thereby avoid swelling this pamphlet to what many may think an unnecessary size, after so many volumes have been written on the subject of agriculture.

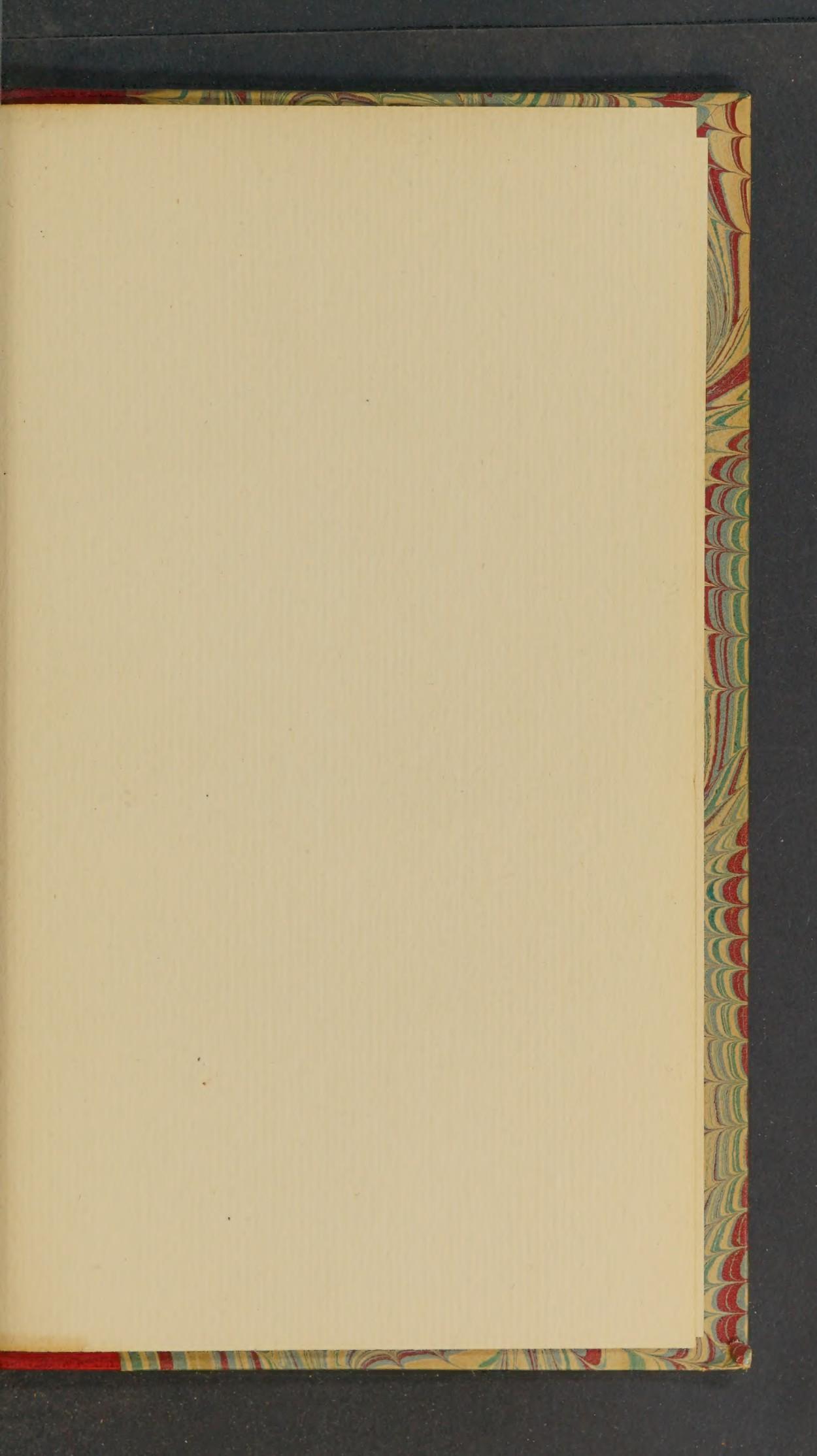
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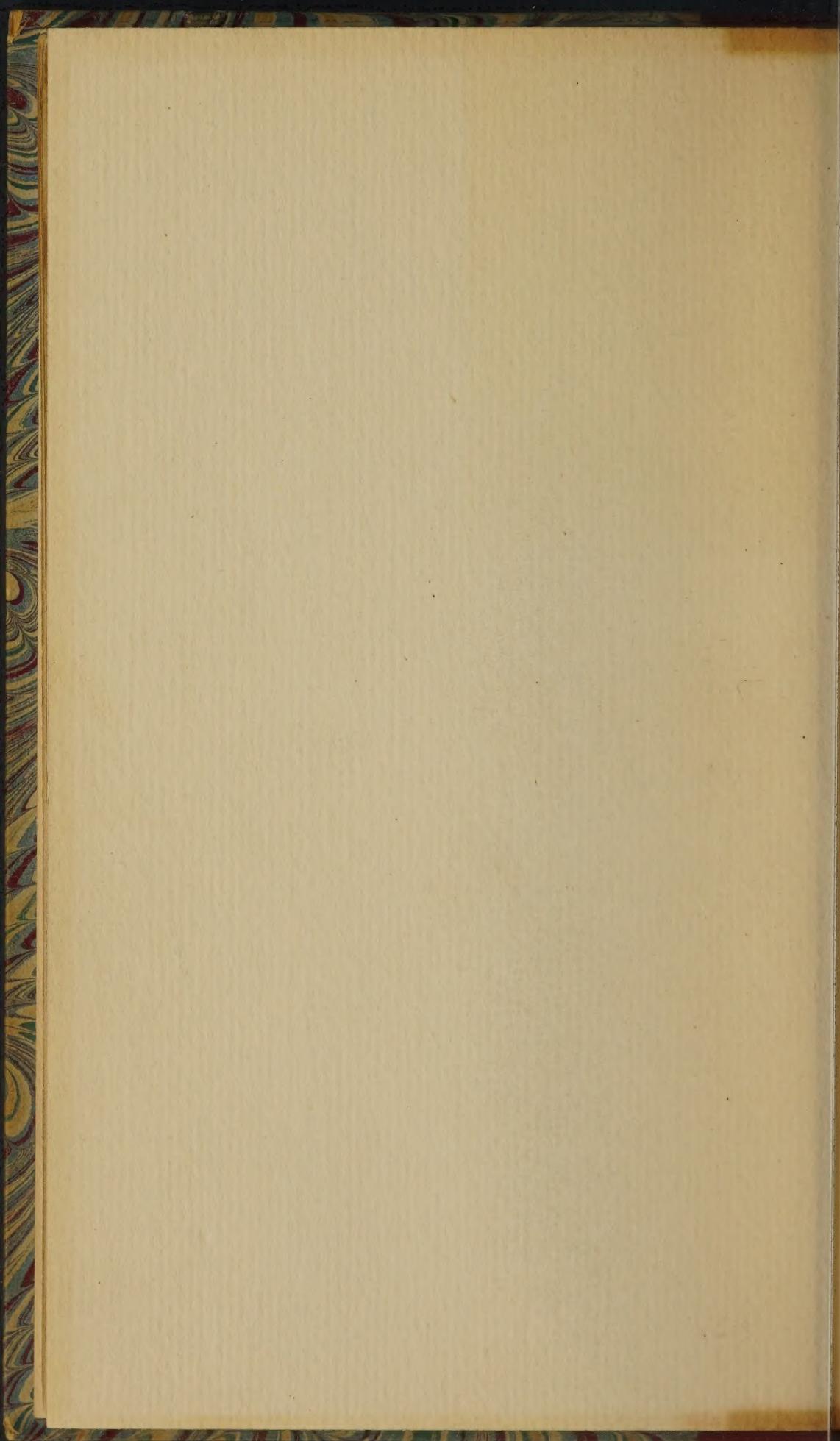


Louis Mayer didit.









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